# LAKE BISTINEAU REHABILITATION PLAN

## INTRODUCTION:

The Lake Bistineau Rehabilitation Plan, herein referred to as the "Plan," is a living document representing an adaptive management approach that will change based on new information, lessons learned and scientific data. The development of this Plan was prompted by the increasing difficulties experienced by landowners and user groups on Lake Bistineau due to the infestation of giant salvinia (*Salvinia molesta*). However, long before the public became aware of how menacing this plant could be to our fisheries resources, our fisheries staff was combating its expansion ever since a few plants were discovered at boat ramp site in 2006. In fact, the department has deployed state and contract sprayers, introduced giant salvinia weevils, conducted numerous treatment experiments, deployed booms, conducted drawdowns and provided information to the public in an effort to control this plant. However, by the end of the 2009 growing season, estimates of total surface coverage exceeded seven thousand acres and the department costs for its treatment were climbing towards two million dollars.

Giant salvinia is a contributing factor responsible for fisheries habitat degradation, decreased water quality, decreased and unsafe boating and fishing access and threatens lake aquatic communities. It is an established aquatic invasive species capable of doubling in biomass in 3-5 days and has the potential to double lake surface coverage every 7-10 days during optimum growing conditions. In Lake Bistineau, the rapid expanding coverage of this nuisance aquatic plant species will require a complex comprehensive approach for its control due to the complexities responsible for its successful growth potential.

The term "rehabilitation" is narrowly defined here as returning the lake ecosystem to a state of ecological productivity and usefulness. Any chance to "restore" the lake to the conditions that existed immediately following the placement of the present day dam and spillway has long passed due to natural processes, development, and anthropogenic practices within the watersheds that continue to affect aquatic habitat complexity. It is believed that both the hydrology and sediment regime have been altered and restoration is neither possible nor should it apply in this Plan. Instead, the Plan will focus on rehabilitating ecosystem functions and characteristics that will support desirable aquatic life and enhance user group access.

By all accounts, the efforts to control giant salvinia coverage on Lake Bistineau have been insufficient, to date. However, the fisheries staff has gained a great deal of insight in the last three years as to what might work through a myriad of trial and error measures. For example, drawdowns, or water fluctuations have proven to be a very effective method to kill aquatic plants, including giant salvinia. On the other hand, herbicide treatments are expensive and have been less effective.

Finally, it would be unrealistic to believe that the actions taken solely by this department in the future will result in any long term solution, or rehabilitation. Rather, long term success will require the formation of tactical alliances among local governments, state agencies as well as private stakeholder individuals and user groups all working together to find ways to implement new strategies.

**ISSUES:**

The first version of the Plan is the result of research conducted by Mark McElroy and the District I Inland Fisheries staff. The author acknowledges that the nature and extent of habitat degradation in the ecosystem is not well defined in most cases, and therefore some mitigating strategies are less developed at the time of this writing due to missing information and/or data. An example of missing information in this instance includes analyses and an overall description of each watershed. Ever since the lake was formed during the 1930's natural processes, agriculture, silvicultural practices, development, road construction, gas exploration, and contaminant introduction within the Lake Bistineau watersheds have all contributed to aquatic habitat degradation.

Aquatic habitats in the lake are in decline, primarily due to silt accumulation in the lake bottom, and nuisance aquatic weed coverage. Poor water quality is the result of introduced nutrients, decreased water depths, poor circulation, cypress tree leaf litter and nuisance aquatic weed coverage. Both boating and fishing access have decreased due to reduced water depths, cypress tree stands, and nuisance aquatic weed coverage.

Lake Bistineau is a 17,200 plus acre lake with contributing watersheds that approach 100,000 acres. The watersheds are located primarily in three parishes and all or parts of several counties in Arkansas. There are local (parishes, counties, cities, towns) and two state governments that have jurisdictional authorities in the watersheds. Within the states, there are state agencies with legal authorities including the Department of Environmental Quality, which oversees water quality standards. Obviously, achieving a consensus between government entities to achieve mitigating measures outlined in this Plan may be difficult to realize due to differences in priorities and capacity.

Giant salvinia is a non native floating aquatic fern species native to Brazil. The plant can replicate vegetatively and under ideal growing conditions can double in biomass every 3-5 days. The plants can form mats on the surface which block out the sun's rays from penetrating through the water column thereby inhibiting photosynthesis. Water quality is typically impaired under these mats, especially in areas with restricted water movement. There are very few aquatic herbicides approved (EPA label) for use on giant salvinia, and even fewer demonstrated sufficient efficacy for controlling this plant. Herbicide treatments are expensive.

The dam and water control structure were inadequately designed to properly manage water fluctuations on Lake Bistineau. The control structure should have been constructed

at the Dorcheat Creek Channel to allow for greater water fluctuation capacity. The capability to conduct drawdowns greater than seven feet is considered desirable to adequately rehabilitate the lake bottom, fish assemblages and control nuisance aquatic weeds.

Cypress tree stands in Lake Bistineau are extensive. Annual fall leaf litter is cumulative on the lake bottom and contributes to reduced water quality and suitable fish spawning habitat. Cypress trees pose a potential boating hazard and reduce boating access in many areas of the lake. Cypress trees also provide frost protection to giant salvinia plants and restrict its movement. Lastly, cypress tree stands reduce water movement and allows for silt to fall out and accumulate on the lake bottom, thereby promoting the development of new bottom contours. It is believed that this contouring effect is responsible for the further development of lagoon areas that tend to not dewater during drawdowns. These lagoons, or moist soil areas act as nursery areas for giant salvinia and are almost impossible to reach by spray boats.

Plant growth requires that nutrients be available for their uptake. The primary nutrient sources in Lake Bistineau are directly related to the runoff in the watersheds. There are suspicions, but little data to support that improperly treated waste water continually adds nutrients into the lake and contributes to nuisance plant growth.

**GOAL:**

**Goal: To identify objectives and comprehensive rehabilitation strategies that address aquatic habitat degradation occurring in Lake Bistineau and to improve both fishing and boating access.**

Living aquatic organisms and their habitats interact dynamically, and this ecosystem is continually affected by natural process and human activities in the watersheds such as oil and gas exploration, development, forestry and agricultural practices and inadequate waste water treatment. Most of these activities have generally contributed, directly or indirectly, to decreased fisheries habitat, decreased water quality, decreased boating and fishing access and improved habitat for nuisance aquatic weed growth. The goal of this plan is to identify comprehensive rehabilitation strategies on Lake Bistineau to conserve and restore fisheries habitat while increasing both fishing and boating access.

**OBJECTIVES:**

**Objective 1.** Reduce the growth and therefore coverage of aquatic nuisance species

**Objective 2.** Improve physical aquatic habitat

**Objective 3.** Improve fishing/boating access

**Objective 4.** Improve fisheries

**Objective 5.** Acquire additional data and information

**LIMITATIONS OF THE PLAN:**

Major deficiencies in this Plan can be traced to the lack of data and information required to answer some very important questions. There is no up-to-date contour map of the lake bottom. Lake Bistineau has been silting in since the dam was constructed, and the rate of siltation has increased in recent years due to anthropogenic practices such as silvicultural practices conducted in the landscape. Efforts to describe dewatered areas during the drawdown were not successful to date due to rain events during fall and winter. Also, there is insufficient data to describe watershed hydrology and water quality. And, while we can generally characterize land practices within the watersheds, there are no analyses of these practices. Consequently, there is an inherent risk of making incorrect assumptions or management recommendations without the analyses afforded by modeling both the sediment transport and hydrology.

The success of this Plan will require the cooperation of other state and local entities, especially those with specific jurisdictional authority over activities in the watersheds. To achieve the goal, both plausible and realistic actions were investigated. Many of the potentially beneficial actions identified are controlled by another agency that may not be in a position to assist the department in our efforts.

Most of the strategies addressed in this Plan require either significant one-time funding or reoccurring funding. The inability to acquire sufficient funding to implement the strategies in this Plan may result in either less than desirable results or complete failure. This Plan makes no attempt to identify specific funding.

**REHABILITATION STRATEGIES:**

1. **To modify the existing water control structure and dam to create the ability to skim plants from the surface, increase drawdown capability to accommodate drawdowns in excess of 7 feet and increase ease to fluctuate water levels.** The Department of Transportation and Development (DOTD) has jurisdictional authority for managing the water control structure. Both LDWF and DOTD have collaborated on developing improvements to the water control capabilities. DOTD has produced a set of plans to modify the existing spillway with skimming capacity. The cost estimate for this modification is $1.5 million.

2. **To modify the lake bed contour to facilitate drainage of shallow areas during drawdowns, increase fish habitat, increase boating and fishing safety and access.** LDWF, Louisiana Office of State Parks and National Guard officials have collaborated in an effort determine the feasibility of utilizing National Guard capacity for this purpose. In addition, LDWF is contemplating the use of a contractor to map the lake bottom using aerial photography. LDWF has

met with the U.S. Army Corps of Engineers to understand permit requirements to perform mitigation measures.

3. **To remove a sufficient number of cypress trees inside the lake to decelerate contour development, increase water flow rates, decrease fall leaf litter, increase boating and fishing access and safety and decrease floating plant restriction to movement.** LDWF and National Guard officials have discussed this action. In addition, LDWF has investigated the idea of using private companies for tree removal.

4. **To construct boating access facilities that allow for boat launching and retrieval during drawdown events.** LDWF has met with all three parishes' government officials to inform them about the Wallop-Breaux Boating Access Program and encourage their participation. LDWF is currently collaborating with Webster Parish in the formation of a quality application to construct a new, deep water boating access facility.

5. **To decrease nutrient influx and increase waster water treatment compliance.** LDWF and Department of Environmental Quality (DEQ) officials are collaborating on how best to acquire appropriate data to characterize the water quality in the lake. In addition, LDWF informed both DEQ and Department of Health and Hospitals officials about suspected non-compliance waste water treatment within the watersheds.

6. **To protect, expand and link healthy, high quality aquatic habitats.** Once the lake is down, fisheries staff will try to identify areas mentioned in Strategy 2 above to incorporate fish habitat restoration.

7. **To develop partnerships in order to increase plan implementation capacity.** LDWF staff have conducted and attended numerous meetings with both public and private groups. Examples of actions identified for individuals or citizen groups include: stationed lake monitors that will relay information to LDWF officials, dead tree removal, aquatic plant control at boat ramps, donation of time and equipment, weevil introduction, etc.

8. **To develop a cost effective nuisance aquatic plant control strategy.** The primary method to cost effectively control giant salvinia on Lake Bistineau is to manipulate water levels in the lake utilizing appropriate modifications to the present control structure and spillway. Again, LDWF and DOTD have investigated these modifications measures and DOTD has prepared a set of plans and cost estimates for renovations at the existing spillway. Preliminary planning to develop a water control structure at the creek channel should be initiated. LDWF has discussed with the Office of State Parks the feasibility of constructing a weevil hatchery at the park. Annual weevil stockings are recommended. Appropriate aquatic herbicide applications, by boat, backpack, and aerial applicators are planned. Once the lake is 7 feet below pool, LDWF

staff will investigate opportunities to strategically remove cypress trees in areas that will enhance access, allow for plants to move and increase boating and fishing safety develop a contour map of dewatered areas, utilize specialized herbicides in trapped lagoon areas; mark boat lanes, locate illegal nutrient discharge sites and deploy booms.

9. **To explore one-time and reoccurring funding opportunities.**

10. **To acquire better, more up-to-date information and analyses about natural processes and anthropogenic practices occurring in the watersheds.** A great deal of information about the watersheds was learned while preparing this plan, however efforts to model both sediment transport and the hydrology should be investigated.

11. **To provide the public access to information about matters affecting Lake Bistineau.** Primarily, the department staff attends meetings as well as publishes updates on the LDWF website.

**ACTION ITEMS SCHEDULED FOR 2010:**

- LDWF will continue to initiate water level fluctuations through out the year whenever it's determined that significant salvinia plant stranding is possible.
- Beginning in March, herbicide spray treatments will commence and continue throughout the growing season. Initial treatments will target large mats in an effort to break them apart to facilitate their movement. After the lake water level reaches 7 feet below pool stage, LDWF will investigate the plausibility for either Sonar or Galleon treatments in lagoon areas.
- Commence contract spraying early in the growing season. Decisions to use boat or aerial methods will be based on the plants surface coverage, ease of treatment, location in the lake and funding.
- Booms will be deployed in the spring to either ease or inhibit plant movement based on the circumstances and amount of boom material available.
- Once the water level is 7 feet below pool stage, LDWF staff will develop a map of the exposed lake bottom. The map will indicate lagoons, illegal waste discharge, targeted cypress trees, salvinia mats and boat lane locations.
- LDWF will work with parishes to improve boat lane marking in dewatered areas.
- LDWF will continue to collaborate with the U.S. Army Corps of Engineers and National Guard in an effort to develop a strategy to rehabilitate the lake bottom, reduce lagoon acreage, increase fisheries habitat and increase boating and fishing safety. Actual lake bottom renovation are scheduled for 2011.
- LDWF will continue to investigate the plausibility of finding a contractor to remove targeted cypress trees for the purpose of freeing salvinia movement, increasing water flow, decreasing contour development, decreasing leaf litter, enhance spray applications, and/or improve safe boater access.

- LDWF will continue to work closely with DHH and DEQ to obtain a comprehensive water quality evaluation and to seek waste water discharge compliance within the watersheds.
- LDWF will continue to work with State Parks in constructing a weevil hatchery/farm at the park.
- LDWF will continue to work with DOTD to modify the existing spillway structure to allow for skimming capacity to minus 4 feet below pool stage. Additionally, LDWF recommends that DOTD initiate the preliminary design phase to construct a new water control structure at the creek channel for greater water fluctuation capacity.
- LDWF will continue to collaborate with Webster Parish and potentially fund the construction of a deep water boat access site at the Port of Bistineau.
- LDWF will continue to work with State Lands to determine property boundaries, state's rights, and obtaining executed easements.
- LDWF will work with individuals desiring to assist with implementing the Plan. Individuals can help by limbing low hanging cypress branches, removing downed timber, treating salvinia at boat ramp sites, serving as monitors for the purpose of reporting information to the LDWF staff and volunteering the use of equipment.
- LDWF will be prepared to attend meetings and make presentations to educate and receive comments. Conduct meetings with legislators, state and federal agency representatives, parish government officials, user groups, property owners and civic organizations.
- LDWF will constantly monitor giant salvinia growth while implementing the strategies and provide updates on the department's website.

**MEASURING SUCCESS:**

The purpose of this Plan is outlined in the Objectives and Goal. The Strategies identify the methods to achieve both the Objectives and therefore the Goal. Implementation of the Strategies will be monitored and assessed by LDWF staff. Most analyses can be quantified, or at least described. Any measurable or descriptive assessment that conclusively contributes to the achievement of one or more Objective shall be considered a success. For example, water fluctuations during the winter months reduced giant salvinia coverage by 40% from the previous June. Or, compliance with point source waste water discharge was increased from 60% to 90%.

**SUMMARY:**

The challenge to control giant salvinia on Lake Bistineau, or any lake for that matter will require a comprehensive and innovative approach that fully considers the contributing factors for its introduction and growth. The consequences realized as a result of the growth of this particular plant species will continue to negatively impact fisheries, fisheries habitat as well as decrease fishing and boating access unless all measures are brought to bear for its control.

To date, water fluctuation should be the primary technique utilized to control giant salvinia on Lake Bistineau. Dewatering sufficiently to strand and dry the plants will kill giant salvinia. The method requires the periodic opening and closing the gates at the water control structure which can be accomplished at little cost. In addition, Lake Bistineau and the water control structure are ideally situated to take full advantage of floating plants like giant salvinia. Lake Bistineau is primarily situated north-south with the control structure at its farthest southern point. Allowing the plants to move south with prevailing winds from the north during several months out of the year would allow for their accumulation at the dam. Modifications to the existing control structure would allow for the plants to passively flow (skim) out of the lake and into Loggy Bayou WMA where the vast majority of plants are stranded.

The other strategies identified in the plan, including herbicide use dove- tail with the water fluctuation concept and any effort to de-emphasize their importance should be avoided. However, spraying herbicides to control giant salvinia on Lake Bistineau is problematic. Their required method of application, expense to purchase and apply and limited efficacy are issues that have to be considered prior to their usage if they are going to considered as a tool to combat giant salvinia on Lake Bistineau or any other waterbody.

Finally, the method of harvesting giant salvinia was considered and determined to be, ineffective, inefficient and too costly to pursue. The equipment required to harvest this plant on a large scale is expensive to purchase and maintain. There are numerous issues that have to be considered when removing the plants from the lake, transporting, and then their eventual disposal. Further, it is generally understood that removing some plants (harvesting) from an area actually invigorates the growth potential for those plants remaining.